

CLAIMS ON APPEAL

1. A process for producing a nanocomposite polymer by dispersing a multi-layered silicate material into a thermoplastic polymer, comprising the step of mixing a quaternary ammonium intercalated multi-layered silicate material with the thermoplastic polymer at a temperature greater than the melting or softening point of the thermoplastic polymer, characterized by the quaternary ammonium intercalated multi-layered silicate material having been reacted with a polyvalent anionic organic material so that the edges of the multi-layered silicate material are bound to the polyvalent anionic organic material to form a polyvalent anionic organic edge coated quaternary ammonium intercalated multi-layered silicate material.

2. The process of Claim 1, wherein the thermoplastic polymer is selected from the group consisting of a thermoplastic urethane, a thermoplastic epoxy, a thermoplastic polyester, a thermoplastic nylon, a thermoplastic polycarbonate; and blends thereof.

3. The process of Claim 1, wherein the polyvalent anionic organic edge treated quaternary ammonium intercalated multi-layered silicate material exfoliates to produce single layers of silicate material and multiple layers of silicate material, the weight percent of the single layers of silicate material being greater than the weight percent of the multiple layers of silicate material as determined by transmission electron microscopy.

4. The process of Claim 3, wherein the thermoplastic polymer is a blend of thermoplastic polymers.

5. A process for producing a nanocomposite polymer by dispersing a multi-layered silicate material into a thermoset polymer, comprising the steps of:

(a) mixing a quaternary ammonium intercalated multi-layered silicate material with a thermoset prepolymer, characterized by the quaternary ammonium intercalated multi-layered silicate material having been reacted with a polyvalent anionic organic material so that the edges of the multi-layered silicate material are bound to the polyvalent anionic organic material to form a polyvalent anionic organic edge coated quaternary ammonium intercalated multi-layered silicate material;

(b) curing the thermoset prepolymer to set the thermoset polymer.

6. The process of Claim 5, wherein the thermoset polymer is selected from the group consisting of a thermoset epoxy, a thermoset phenolic, a thermoset urethane, a thermoset rubber and blends thereof.

7. The process of Claim 5, wherein the polyvalent anionic organic edge coated quaternary ammonium intercalated multi-layered silicate material exfoliates in step (a) to produce single layers of silicate material and multiple layers of silicate material, the weight percent of the single layers of silicate material being greater than the weight percent of the

multiple layers of silicate material as determined by transmission electron microscopy.

8. The process of Claim 7, wherein the thermoset polymer is a blend of thermoset polymers.

9. The process of Claim 1, wherein the thermoplastic polymer is selected from the group consisting of polypropylene, polyethylene, polystyrene, polystyrene copolymers, acrylic polymers, acetyl polymers and thermoplastic elastomers and blends thereof.

10. A composition comprising:

(a) a polymer; and

(b) a multi-layered silicate material dispersed in the polymer, the multi-layered silicate material having edges, characterized by at least a portion of the edges of the multi-layered silicate material being bound to a polyvalent anionic organic material.

11. The composition of Claim 10, wherein at least about one half of the edges of the multi-layered silicate material are bound to the polyvalent anionic organic material.

12. The composition of Claim 10, wherein the polymer is selected from the group of thermoplastic polymers and thermoset polymers and blends thereof.

13. The composition of Claim 12, wherein the thermoplastic polymers and thermoset polymers are selected from the group consisting of a thermoplastic urethane, a thermoplastic epoxy, a thermoplastic polyester, a thermoplastic nylon, a thermoplastic polycarbonate, polypropylene, polyethylene, polystyrene, polystyrene copolymers, acrylic polymers, acetyl polymers, thermoplastic elastomers, thermoset epoxy, a thermoset phenolic, a thermoset urethane, a thermoset rubber and blends thereof.

14. The process of Claim 4, wherein the polyvalent anionic organic material is a polyacrylate.

15. The composition of Claims 13, wherein the polyvalent anionic organic material is a polyacrylate.

16. A process for producing a nanocomposite polymer, comprising the steps of:

(a) mixing a quaternary ammonium intercalated multi-layered silicate material with a monomer, characterized by the quaternary ammonium intercalated multi-layered silicate material having been reacted with a polyvalent anionic organic material so that the edges of the multi-layered silicate material are bound to the polyvalent anionic organic material to form a polyvalent anionic organic edge coated quaternary ammonium intercalated multi-layered silicate material; and

(b) polymerizing the monomer.

17. The process of Claim 16, wherein the monomer is a blend of monomers.

18. The process of Claim 16, wherein the polymer is selected from the group consisting of a thermoplastic urethane, a thermoplastic epoxy, a thermoplastic polyester, a thermoplastic nylon, a thermoplastic polycarbonate, polypropylene, polyethylene, polystyrene, polystyrene copolymers, acrylic polymers, acetyl polymers, thermoplastic elastomers,

18. The process of Claim 16, wherein the polymer is selected from the group consisting of a thermoplastic urethane, a thermoplastic epoxy, a thermoplastic polyester, a thermoplastic nylon, a thermoplastic polycarbonate, polypropylene, polyethylene, polystyrene, polystyrene copolymers, acrylic polymers, acetyl polymers, thermoplastic elastomers,

19. The process of Claim 18, wherein the polyvalent anionic organic is a polyacrylate.